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Is Perception an Illusion ?

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Perception.—The mechanism of illusions forms an interesting problem in Experimental Psychology. Illusions are really false perceptions. To understand the mechanism of any illusion therefore the peculiarities of an ordinary perception must be analysed. Perception has been described as a selected group of sensations intermixed with images and the whole process having a definite meaning. I see a tiger ; the visual impression produced by the tiger and the smell form the sensation portion of the perception. These sensations bring into the mind, it may be in an unconscious manner, certain images about the tiger from the storehouse of my memory. I might have seen a tiger previously or I might have read about such an animal. These groups of images get mixed up with the sensations and produce a change in my mental attitude. I might think of fleeing from the tiger or I might think of shooting him if I happened to be a *shikari*. This *action attitude* constitutes the essential portion of the perception and is its *meaning* part. No perception is possible without an action attitude. Sensations and images are really products of analysis of perception. What we are familiar with in real life is perception and not sensation. A sensation apart from a perception cannot exist as a psychic entity. Sensation is of course an element of the mind, but this

element never exists in the free state.¹ All objects which we see and everything that we perceive have got some sort of meaning attached to them. Very often this meaning on analysis is found to be a group of kinaesthetic sensations. It may be that the meaning is not discernible consciously but exists as a definite potential attitude with reference to the object perceived. The meaning here can only be described in terms of physiology or in terms of unconscious mental process. It is a matter of common experience that young children, when asked to describe an object, give its description in terms of its use. Here the meaning element is very prominent. In the adult the description takes the shape of definition of its characteristics and the meaning element can only be discerned after analysis. A very interesting fact in connection with this is that philology teaches us that all nouns have their origin in certain roots which are verbs. A verb always signifies an action and the roots of nouns imply that the action attitude underlies the perception of the objects. I would go so far as to assert that without an action attitude perception ceases to exist. If we are able to remove this action attitude with regard to an object, perception disappears from consciousness and conversely in certain cases the action attitude alone may be responsible for certain perceptions without any corresponding external object being present. Let us take the case of what in psychology is called an *adaptation*. It is a well-known fact that a person wearing spectacles becomes completely oblivious of its presence. The pressure on the nose, the glasses before the eyes all cease to exert their presence. We do not also feel the pressure of our clothing unless we move. This failure to notice certain sensations must be carefully distinguished from the disappearance of perception as a result of fatigue. Perception disappears from consciousness in adaptation because the action attitude

¹ I have used the term sensation in place of perception in some places in my article to render the sense more clear.

loses its significance. There is no necessity for the organism to react to the particular group of sensations concerned in an adaptation:

Illusion.—Hallucinations and illusions are common in certain types of insanity. In all such cases careful analysis would show the presence of a definite action attitude. An insane person of the paranoiac type for instance who may be suffering under the delusion of being poisoned, perceives taste and smell in food, which do not really exist. Such false perceptions are the direct result of his mental attitude. Students of psychology would often misread 'physiology' as 'psychology' and conversely students of physiology misread 'psychology' as 'physiology.' Such false perceptions are only possible because of a fixed mental attitude in the person concerned. The greater the mental domination of such an attitude the greater is the possibility of a hallucination or an illusion. In connection with this a very simple and interesting experiment may be performed.

Experiment I.

Line up a number of persons and place a prize at some distance. Give clear instructions that any one who reaches the prize first would get it, but he is to run only when he hears the signal 'one, two, three' and not on any other signal. Now say 'ready—one, two, free,' you will find the whole lot running for the prize and the winner at least is sure to attest that he heard the signal 'one, two, three' correctly. Now repeat the experiment with another set of persons and instead of saying 'one, two, three' say 'one, two, seven,' you will find a certain number running for the prize, and the greater the value of the prize and the greater the desire to get it the greater is the chance of competitors hearing 'seven' as 'three.'

In reaction time experiment the subject, particularly if he is prone to the muscular type of reactions, would assert that he apprehended the signal even when none was given. The above experiments serve to indicate the genesis of

illusions. Many different explanations have been given for illusions. I would assert that in all cases of imaginary or wrong perceptions an unnoticed action attitude is the responsible factor. The visual illusions described in text books of psychology may all be explained satisfactorily on this supposition. It must be remembered however that the action attitude is very often unconscious and requires special analytical efforts to bring it out.

Correction of Illusion.—I have tried to explain above the importance of an action attitude in perception. A very important question arises here as to whether any illusion may be corrected by adjusting the action attitude. I would assert that such correction is possible. A person who is free to control or inhibit his action attitude does not experience any illusion. Now inasmuch as the action attitude is at the base of all real perceptions also it stands to reason that with the inhibition of an action attitude a perception is also bound to disappear from consciousness. I shall try to show that this is really so by describing actual experiments. The question whether the action attitude can be inhibited in every case need not be discussed here. It would be quite sufficient for my purpose to show the possibility of the inhibition of the action attitude and the consequent disappearance of the perception from consciousness in a few cases only. Before we discuss this problem I should like to elucidate certain other characteristics of a perception.

Subjective and objective reference in perception.—Every perception has got a dual aspect—a subjective and an objective phase. When I perceive an object, say a lamp, I see the lamp as something distinct from me, that is, as an object outside my ego. This is the objective phase of perception. The lamp produces certain sensations in me. Its shape, its size, the intensity of the light, etc., are my subjective experiences, that is the ego feels these sensations as its own. The presence of an object outside the ego can only be appreciated

by changes in the ego. These changes are accounted for by the ego as due to the presence of something concrete existing outside. It should be clearly understood that the presence of an outside object cannot be judged except by the psychic changes that such objects produce in us. In other words a portion of our mental experience is *projected* outside and is responsible for the apprehension of an outer world. This process in perception I have termed *objectification*. Unless this objectification takes place no external object is perceived.

Direction of attention in perception.—The direction of attention in perception may be either towards the external object or towards the subjective changes produced by the object. When I see a tiger I do not pause to consider what changes the tiger produces in me. My whole attention is engrossed with the tiger before me and I react to it without feeling the changes that take place in me. In a visual perception the attention is mostly directed towards the object. In tactual, gustatory and olfactory sensations the attention is usually towards the subjective experience. Kinaesthetic perceptions generally elude our observations but when these are noticed the attention is generally focussed upon the subjective side. Auditory perceptions stand in a position midway between the visual and tactual. This direction of attention is discernible in our speech. We say "I see an object," but "I am cold." In the latter case a subjective feeling only is described. It will be noticed that the different sense organs are not all equally adapted for objectification. The apprehension of an object usually comes through the instrumentality of vision. The other sense organs play a more or less secondary part at least in the normal individual. In the case of the blind of course this is quite different. I have said above that the attention is usually directed towards the object and not towards the subjective experience produced by the object. One can easily understand why this should be so. Biologically the organism has to react to

external 'objects.' In certain cases of psycho-neurosis the usual direction of attention is altered and the person becomes a subject of an introspective nature. He is more concerned with his own sensations and feelings than with the outside world. Biologically speaking this is not a desirable state of affairs. When this condition reaches its extreme limit as in dementia praecox the individual becomes completely oblivious of the external world. This state of affairs can be produced in a small measure at least experimentally, as I shall presently show. When this happens the objectification phase of the perception disappears from consciousness altogether.

Localization.—I shall now discuss another important characteristic of perception, *viz.*, the element of *localization*. This element of localization is not present in all types of perception. In the aesthetic perception of a musical harmony for instance localization is absent. In most types of perception however we can distinguish localization in both its subjective and objective aspects. An object is localized in a certain point in space and a sensation is localized in a certain region of the body. The localization capacity of the different sense organs varies. In vision the localization is very perfect so far as the external object is concerned but it cannot be distinguished in its subjective phase. In hearing the objective localization is less perfect than in vision and subjective localization is also extremely vague. In fact one may be tempted to deny it at first. In smell and taste the subjective localization is more developed whilst the objective remains rudimentary. In kinaesthesia the subjective localization is fairly well-marked and in tactual sensations it is almost perfect. The objective localization is more developed in touch than in smell and taste. The localizing capacity runs *pari passu* with the direction of attention in most cases. In internal sensations the subjective localization is indefinite.

I would like to point out here that both the subjective and the objective phases of a perception are invested with

distinct action attitudes so that each phase may be considered as complete in itself. Owing to the presence of this action attitude illusions and hallucinations are possible both in subjective and objective perceptions and if such action attitude is neutralized the disappearance of the perception from consciousness may be expected. The objective phase is more or less a projection from the subjective one hence if the subjective phase vanishes completely, the objective also follows suit or in other words an object which produces no psychic change in us is an impossibility.

I shall now describe a well-known classical experiment to illustrate my points :

Experiment II.

Hold firmly with the forefinger and thumb a pencil and touch an object therewith ; the sensation is referred to the extremity of the pencil touching the object.

Obviously this is an illusion. The objective localization remains more or less unimpaired in this case but the subjective one experiences an illusion. It seems as if the pencil tip is sentient. The illusion is capable of being corrected with practice. On repeatedly doing this experiment and trying to localize the sensation produced by the touch of the pencil with the object it will be noticed that the sensation lies not on the pencil tip but on the fingers holding the pencil and in the joints of the fingers, palm and wrist. With the correction of the illusion the localization has changed.

The Mystery in localization.—The experiment is much more instructive than would appear at first sight. Obviously the pencil cannot feel and so there is no difficulty in describing the effect as an illusion ; but this raises a very important question. Which is the organ that really feels ? Innumerable experiments have definitely proved that the brain is the physiological centre for a perception. How is it then that the finger feels ? It is usually urged that the finger has a

sentient surface, but it should be noticed that it is sentient only so long as its connection with the brain remains unimpaired. If there is any lesion either in the brain centre or in the connecting nerves the finger fails to notice the touch. The brain therefore is the essential physiologic centre for perception. On the other hand in cases of amputation, sensation is very often referred to a portion of a limb which does not exist. In dreams and hallucinations perceptions occur, which have no real objective counterpart. The mystery therefore deepens. The finger it would seem is no better off than the pencil so far as its capacity for perception is concerned. One can feel a sensation in the finger even without the finger. Is the normal sensation of touch then illusory like the sensation at the pencil tip and can such illusions be corrected? I would assert that it is so. All our perceptions are illusory in the sense that the perception on the pencil tip is illusory. That this is not a mere theoretical assertion would be presently proved by experiment.

The mystery in localization will be better understood by an example. Let us take the analogy of a telegraph operator listening to the ticking of his receiver. Suppose the message is coming from a station 'X.' The operator understands the meaning of the ticks and *knows* that the message is coming from 'X.' He never *feels* it to be originating from 'X.' In the case of a sensation, such as touch, the ego which represents the operator in the analogy not only knows that the sensation comes from such and such a part of the body but actually feels it to be there.

Empathy.—Under ordinary conditions subjective localization is limited to the body of the ego but it may be projected outside under special circumstances as in the case of the pencil experiment mentioned above. What psychologists describe as *empathy* is a case in point. It has been said of Saint Ramkrishna that on one occasion he saw a person giving a hard slap to another on the back. Ramkrishna immediately

cried out in pain and complained that he felt the blow on his own back. On examination the back showed a red wheal. This is an extreme case, but such instances are sometimes seen in psycho-neurotics also. In all these cases the personality extends beyond the limit of the body and perceptions experienced by others are felt to be the subject's own. This is something different from sympathy. In our language instances of such projection may be easily discerned. When we say that "Sugar is sweet," we have unconsciously projected the sweet taste which we ourselves feel on to the sugar; so instead of saying that sugar *produces* sweet taste in the mouth we simply say that sugar *is* sweet. All adjectives therefore denote projection.

Objectification.—When localization is projected outside the ego and at the same time the ego is not extended to consider the perception as its own, the process becomes identical with objectification. Here the bond of union between the perception and the ego is incomplete and the group of perceptions is felt as an external object. This forms the objective reference of perception. I have said that the bond between the ego and the perception is only incomplete in objectification; it is not completely severed and the portion that remains goes to form the subjective reference of perception. An objection might be raised that according to the view propounded here external objects are nothing but an outward projection of perception and as such they must be illusory; how do then perceptions arise? I do not propose to discuss this question here. Of course it might be said in answer to the above that perceptions are but creations of the ego but as this would lead me into the domain of philosophy and as I have no experimental data to answer the point, I drop the question for the present.

Perception—an Illusion.—My standpoint is experimental, and I shall produce evidence here to show the illusory nature of perception in both its subjective and objective aspect.

Experiment III.

Weight a large-sized cork with a piece of sheet-lead and put the cork on the bare arm of your subject who must be a careful introspector. Ask your subject to keep his eyes closed from the beginning of the experiment. The subject will cease to feel the pressure of the cork after a time. It would appear from introspection that localization disappears first, the sensation getting more and more diffused over a progressively larger area. The intensity of the pressure sensation diminishes gradually and finally the quality ceases to be felt.

This simple experiment is familiar to every student of psychology and is intended to demonstrate the phenomenon of adaptation. The question arises why should there be a failure of perception in adaptation? We might venture a biological explanation for this. Wherever there is adaptation the organism has adjusted itself to its environment and there is no further necessity for a reaction. The action attitude with reference to the particular stimulus has either ceased to exist or has been inhibited and I would say that this is the reason for the disappearance of the perception from consciousness. Of course the inhibition of the action attitude goes on in the unconsciousness plane and is not appreciated by the subject easily.

Experiment IV.

Touch the back of the wrist of the left hand lightly with the tip of the forefinger of the right hand and try to localize the sensation produced. It would appear to be located on the back of the wrist and not on the finger tip.

This experiment as well as the subsequent ones require a trained introspector. The subject must be able to dispense with his preconceived notion regarding the localization of touch sensation. Very few people will be ready to admit that the finger may touch a surface and yet not feel it.

Now we know that both the finger tip and the back of

the wrist are sentient surfaces. How is it then that the sensation from the finger tip is not appreciated in this case? The result certainly is not due to adaptation as in the previous experiment. Before I attempt an explanation I shall describe a few other experiments.

It must be noted here that the failure to appreciate the sensation at the finger tip may be overcome after careful practice and the subject will then be able to perceive the sensation at both the opposed surfaces. Untrained observers might sometimes assert that the sensation was located at the finger instead of at the wrist or at both. This however is not correct as numerous careful observations on different individuals have shown. The localisation will be easier if the finger be gently moved over the surface of the wrist. Why this should be so I shall point out later on.

Experiment V.

Touch with the palm of the right hand the back of the left forearm; the sensation is located on the left forearm. Here also the failure of perception in the right palm may be overcome after careful and repeated introspection.

Experiment VI.

Touch with the tip of the tongue the back of the left wrist. The wrist only feels.

Touch with the forefinger and with the tip of the tongue different portions of the skin. The forefinger and the tip of tongue do not feel. The skin touched only feels.

Experiment VII.

Touch with the forefinger the tip of the tongue. In most persons the sensation is located on the tongue.

Experiment VIII.

Appose different portions of the skin and note localization of sensation.

Experiment IX.

Touch the forehead with the knuckle of the bent forefinger and move the forehead from one side to the other. The finger appears to move and not the forehead.

Experiment X.

Touch tip of the left fore-finger with the tip of the right and try to localize the sensation. There is very great difficulty in localizing the touch. The same difficulty is also experienced when two similar surfaces touch, *e.g.* palm and palm, wrist and wrist, etc. When two forefingers touch the left usually feels in right-handed individuals and the right in left-handed individuals.

Experiment XI.

Appose the tips of the corresponding fingers of the two hands and maintain a steady pressure. Close your eyes and flex and extend the fingers of both the hands simultaneously in a rhythmic manner. It would appear that a solid plate has been interposed between the fingers of the two hands.

The Law of Localization.—The failure of perception in a sentient surface in Experiments III, IV, V, VI, VII and X and the illusory perceptions in Experiments I, II, IX and XI are very instructive. We cannot ascribe the result to adaptation, nor can it be ascribed to inattention. The illusions are not removed even when we deliberately direct our attention to them. They can only be corrected after repeated trials. That the imperception and illusions are due to the influence of action attitude will now be evident. Biologically the action attitude is the potential tendency for reaction to a stimulus. The hand is the prehensile organ in man and the fingers are the chief agents in prehension. The general body surface has more or less a protective function. The greater the sensitiveness of the prehensile organ the greater is the advantage to the organism. No wonder therefore that

the finger tips show the greatest sensitivity. Aesthesiometric investigations clearly prove this. Next to the finger tips the tip of the tongue shows the greatest sensitiveness. This also is explainable on the basis of the tongue acting as a prehensile organ so far as food is concerned. When we are suspicious about the quality of a food we touch it gingerly with the tip of the tongue. Biologically it is advantageous for the prehensile organ to be sensitive so that the organism immediately perceives that an object is presented before it but at the same time it is desirable that the organism directs its attention to the object and not to the sensations produced by the object or in other words an objective reference of the perception is desirable in a prehensile organ, that is, objective localization is preferable to a subjective one. We therefore find that sensitiveness and objective localization develop at the expense of subjective localization. In the department of visual perception also these characteristics are well marked. On the other hand with protective organs such as the general body surface the objective reference is at a discount and subjective localization is more prominent. We can therefore formulate a general law that the *localizing capacity of any part of the skin varies inversely as its aesthesiometric index*. This law I have been able to prove experimentally also.

Action attitude.—We can now understand that when the forefinger or the tip of the tongue touches a less sensitive portion of the skin it is the latter that feels because of a definite action attitude in the prehensile organs. The prehensile organs are also concerned in all aggressive movements so that when the forefinger moves the illusion of imperception is easier to notice and the illusion of movement in the forehead experiment becomes easy to understand. In right-handed persons the left forefinger feels when it is apposed to the right as in Expt. X because the right hand is better adapted for prehensile purpose. Expt. XI in which the illusion

of a solid intervening plate is felt between the fingers is very interesting. As the apposing surfaces have similar sensitivity, localization becomes almost impossible and the objectification tendency manifests itself by creating an illusory object between the fingers. The perception is referred to this imaginary object by both the apposing surfaces. The pressure sensation gives rise to the imaginary hardness and solidity of the plate.

The above experiments will have served to prove the importance of action attitude in all illusory perceptions. If we analyse cases of imperception in inattention the same motive will also be apparent. When we attend to a particular thing we generally inhibit our action attitude, unconsciously of course, with reference to other objects so that these latter are not noticed.

Normal perception.—Hitherto I have been dealing with illusory perceptions. I shall now take up the case of normal perception.

Experiment II.

Hold a coin between the forefinger and thumb of the right hand. Close your eyes and try to locate the sensation. The knowledge of the coin being there aids the objective reference to the perception at first. Concentrate your attention on the sensation. *The objective reference will gradually disappear* and it would be realized that the idea of the coin being held between the fingers was the result of images which had nothing to do with the present perception. At this stage the "Object" has vanished and the subjective portion of the perception remains only. Now move your hand round and round. Does the sensation move in space? At first it seems it does. Try to eliminate the kinaesthetic perceptions in connection with the motion of the hand and also the visual imagery of movement. Concentrate your attention on the original perception only. *The illusion of movement of sensation (which must not be confounded with the sensation of movement) is now overcome and the perception stands out as something unique.* Continue your introspection and try to eliminate the visual imagery of the hand, etc., and the kinaesthetic sensations arising from different parts of the body. *The subjective localization of the original perception is now lost* and as the introspection becomes more intense and

deeper *the original sensation loses its attributes of intensity, clearness, duration and quality.* The perception has practically vanished and in its place is left a peculiar something which for want of a better name may be called "*pure consciousness.*" It is not the consciousness of *this* or *that* but it may be called a consciousness without an object. The feeling is something queer and indefinable.

Pure Consciousness.—The above experiment will not be successful in a person untrained in careful introspection and even with a careful observer it may require repeated experiments for days together before success is achieved. In most persons there is a sort of innate resistance and unwillingness for introspective work of this nature and there are individuals in whom the experiment will never be a success, their personality being a bar to it.

The results obtained in a successful experiment of this type deserve our close attention. The original perception has at first an objective spatial localization. On moving the hand round and round this objective spatial attribute is made prominent and is felt at first as an illusion of actual movement of the sensation itself. The illusion is afterwards corrected and later the subjective localization also vanishes. Now this result, although it seems very peculiar at first sight, is fully borne out by theoretical considerations also. A sensation is a psychic affair and as such it is obviously absurd to attribute to it any physical characteristic such as that of motion. On the same ground it cannot occupy or be located in physical space. All objective and subjective localization must therefore be of the nature of an illusion. A sensation therefore cannot in reality be located in any portion of the body such as the skin or the brain. In the experiment of the pencil the sensation is at first located on the pencil tip, then it is felt in the fingers and if the introspection be pushed deeper the localization at the fingers will also disappear as in the present experiment. We are thus forced to admit that a *perception has no real localization.*

Not only has a sensation no localization but its attributes of intensity, clearness, duration and quality are all illusory as has been shown in the experiment mentioned above. Theoretical consideration would also support this. Intensity, clearness, duration and quality can only be appreciated by *comparison* with other sensations. Had there been only a single sensation in this world there would have been no question of all these attributes. If we could forget the past every sensation would be a unique occurrence without any attribute as is felt in the experiment cited. It would cease to be a sensation and would be a "pure consciousness." The tendency to relate an experience with the past is responsible for the origin of attributes in a sensation. This tendency again may be described as an action attitude. When this tendency is neutralized the perception loses its link with all other perceptions and merges into "pure consciousness."

The above generalization may seem too rash on the basis of a single experiment. Can all our perceptions be made to merge into "pure consciousness?" I can only cite results of my own introspection to answer this question. So far as the perceptions of touch are concerned in the different portions of the body I am able to overcome both the objective and the subjective reference and to realize the state of "pure consciousness." The success has come only after months of practice and even now it is not always assured.

Under certain moods the experiment would not succeed try however I might. With painful sensations of moderate intensity the experiment succeeds but not when the pain is intense. When success comes pain ceases to be felt.

I have also been successful in the case of kinaesthetic, gustatory and olfactory perceptions. The auditory perceptions resisted all my efforts for more than a year and the success here is only partial as yet; it comes and goes. The greatest difficulty has been experienced in the case of vision.

It is so very difficult to distinguish between say a pencil as an object and the visual sensation produced by the pencil subjectively. The objective reference is ever so much stronger than the subjective one. I might mention here that I have got a very poor visual imagery. I have reasons to believe that the visual subjective reference is more marked in artists and painters so that the experiment might be easier in their case. The feeling of "pure consciousness" is identical in all types of perceptions.

Psychological speculation.—Supposing for a moment that it were possible for any one to completely realize at will the state of "pure consciousness" with reference to all perceptions it would be a fascinating psychological speculation to consider his position in life.

The external world has a different meaning in his case and although under ordinary conditions he sees and feels everything just like a normal individual he *knows* his perceptions to be illusory. It is like the case of a person experiencing an illusion (*e.g.*, the illusion of a sentient pencil tip) knowing it to be an illusion. If he so chooses he can make the external world drop away from him. He can thus rise above pain and pleasure at will. The state will not be one of absolute blank as in unconsciousness but the queer something which I have described as "pure consciousness" would remain. Whether the ego would choose to get back into the normal state from such a condition, and if so how, are problems which cannot be answered at present. The philosophical implications of such a situation need not be described here, being beyond the scope of this paper.

Further investigations.—Apart from all theoretical and remote possibilities the experiments cited above deserve our earnest consideration. Psychologists have found it difficult to analyse the ever elusive ego. In my opinion the problem would be nearer solution by this method of investigation than by any other. The action attitude, about which I have

spoken so much, would on ultimate analysis be recognized to be an element of the wish type so far as its psychological aspect is concerned. The kinaesthetic and other types of perception in action attitude are not the ultimate elements of it.

Under these conditions the will becomes the most fundamental attribute of the ego. The true nature of will however has yet to be found out. Our previous experiments have shown that perceptions are illusory and may be overcome by introspection. The return of the illusion requires careful investigation and is likely to yield the clue to the mystery of the will. I shall close this paper with a quotation from *Kathopanisat*.

Paránci kháni byatrinat swayambhu
 Stasmát paráng pasyati nantarátman
 Kaschiddhirah pratyagátmánamaikhshad
 Abritya chakshur amritatwamichhan.

Ordained by the Eternal's grace
 The sense-doors only outward face ;
 Hence outer view : the inner soul
 Lies beyond our vision's goal.
 The tranquil and discerning wise
 In quest of bliss a course devise :
 With averted eye within them hold
 A vigil, and the soul unfold !

Some Experiments on Fechner's Paradox

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The paradox in Fechner's Experiments consists in this that in certain cases a diminution of physical stimulus causes an increase in the intensity of sensation and an increase in the former causes a decrease in the latter. He found that if a dark glass were placed before one eye of an observer while the other eye remained uncovered then the closing of the eye under the dark cover would cause an increase in the brightness of the visual field, and its opening a decrease. It was noticed, however, that this result was not absolute but depended on the degree of the darkness of the glass that was used to cover the eye. If it was not darker than a certain degree which varied with different individuals, the closing of the covered eye produced a darkening of the visual field (the positive result) ; while with the other degrees of darkness the opposite result (the negative result) was produced. It is natural therefore to suppose that among the different degrees of darkness there is a particular degree which when used to cover the eye does not produce any change in the brightness of the visual field when the eye under it remains open or closed and that with lighter glasses the positive, and with darker glasses the negative result follows. This has accordingly been called the Indifference Point. To find out as approximately as possible the position of this Indifference Point was the object of the experiment here described.

The apparatus that were used in the experiment were simple enough, consisting mainly of two colour-wheels, white and black paper discs, black velvet, measuring instruments, etc. One of the colour-wheels which we shall designate as (A), was such that with the help of a scale definite changes

in the sectors of the rotating papers could be introduced during rotation of the wheel by means of turning a screw. The other colour-wheel (B), had no such arrangement.

In order to understand better the method employed in the experiment it is necessary to refer to another fact of visual sensations which is now well known and established beyond controversy. The fact, *viz.*, that the peripheral part of the retina is more sensitive to brightness than the central one. We need not go into details here regarding the fact except remarking that a certain degree of brightness appears brighter in indirect vision than in direct. This fact was taken into account and the following method was employed :—

In a big room of the Psychological Institute of the University of Leipzig having two windows on the south side, the subject sat on a revolving chair facing an eastern wall at some distance from one of the windows. A considerable part of this wall was covered by a screen of black velvet. Before the screen was placed a black table and on the table colour-wheels were arranged. The wheel (A) was placed in a fixed position in such a way that the centre of the disc was in the same level with the eyes of the observer when he placed his chin on the chin-rest the position of which was also fixed. The eyes of the observers were always at a fixed distance of 30 cms. from the centre of the disc A on which he fixated. A position of the colour-wheel (B) in the same vertical plane as (A) was now found so that when an observer fixated on the wheel (A) he could not see it. After making several tests with different individuals a position was ultimately determined upon. It was so that the centres of the two discs were at a distance of 38 cms. from each other and the line joining them formed an angle of (25°) with the horizontal line drawn through the centre of (A). All the metallic portions of the wheels were now covered with black velvet and paper so that no disturbing element in the visual field of the observer distracted his attention or influenced his judgment. Now the

experiments began. The window which was nearer to the table was always covered with black curtains so that light from this window did not directly fall on the discs. On the colour-wheel (B) was put black and white papers in different proportions so that when rotated they produced different shades of grey. On the wheel (A) was also placed black and white papers and both the wheels were set in rotation. The subject's task was to fixate on the centre of the wheel (A) with his right eye and to compare the brightness of the directly seen disc with that of the indirectly seen. On a given signal the subject opened his eye fixated for a moment then closed his eye immediately and gave his judgment. According to the nature of his judgments the experimenter altered the proportions of black and white in the disc (A) till in the judgment of the observer the two compared brightnesses were equal. The proportion of white and black in the wheel (B) was regarded as standard and the excess or defect of the amount of white in (A) over that of (B) when "equal" judgments have been rendered were recorded. Each comparison was repeated ten times, five times beginning with too white in (A) and five times with too dark and the average was noted. Similar procedures were again followed but now the subject fixated with both eyes instead of one. And again the excess or defect of white was noted.

The problem was therefore now reduced to this : what effect the opening of the left eye has in the estimation of the brightness. It must be remembered that even when both eyes are opened the wheel (B) is seen by the subjects not binocularly but monocularly. As has been said above care was taken to determine the position of (B) in such a way that this result might be obtained. So that by comparing the amounts of white required in equating with one and two eyes we are in a position to obtain exactly the influence of the other eye.

In order to avoid confusion of thought which is liable to

occur at the first sight of the results it is necessary to illustrate by an example how the values given in the Results are to be interpreted. Suppose the standard chosen was $50^{\circ}\text{W} + 310^{\circ}\text{BK}$. With one eye the subject required $+12^{\circ}\text{W}$, *i.e.*, in his judgment under the conditions of the experiment a brightness of $62^{\circ}\text{W} + 298^{\circ}\text{BK}$. seen with one eye directly matches a brightness of $50^{\circ}\text{W} + 310^{\circ}\text{BK}$. seen indirectly. It is evident that the object of indirect vision appears brighter. Now when the subject fixates with both eyes, he requires $+18.5^{\circ}\text{W}$ (the illustration is taken from one of the actual results); thus, under the conditions of the experiment a brightness of $68.5^{\circ}\text{W} + 291.5^{\circ}\text{BK}$. directly seen with both eyes matches a brightness of $50^{\circ}\text{W} + 310^{\circ}\text{BK}$. indirectly seen with one eye, the same eye being used as in the previous experiment. Here also the indirectly seen is brighter. The question now is, what is the relation of this equation to the former? It is seen that more white is needed in this particular case when the fixated disc is binocularly seen than when monocularly seen; that means that the opening of the other eye produced a darkening of the visual field to compensate which more white had to be taken, a typical case of paradox. Arguing in the same way, when we find that under the conditions of the experiment less white is needed in matching with both eyes than with one, we should conclude that the opening of the other eye had a brightening effect, to balance which some amount of white had to be deducted, the positive result of Fechner.

The discs that we used throughout the experiment were cut out from the same white and black papers and were 8 cms. in diameter. By photometric measurements the ratio of the black and white was found to be 1:40.

Prof. A. Kirschmann of the Leipzig University under whose guidance we conducted the experiments was kind enough to let us have the benefit of his long practised power of observation by serving us for some time as an observer. Other observers were all advanced students of the institute

most of whom were well trained in scientific observations. We spent a considerable time in making preliminary experiments.

We first began our experiments with the following shades of gray, *viz.*, $30^{\circ}\text{W} + 330^{\circ}\text{BK.}$, $60^{\circ}\text{W} + 300^{\circ}\text{BK.}$, $90^{\circ}\text{W} + 270^{\circ}\text{BK.}$, $120^{\circ}\text{W} + 240^{\circ}\text{BK.}$, $150^{\circ}\text{W} + 210^{\circ}\text{BK.}$, and $180^{\circ}\text{W} + 180^{\circ}\text{BK.}$ The results showed that while with 30°W the effect of the opening of the left eye resulted in a diminution of the brightness of the field, all shades of gray beginning with 60°W and above appeared brighter with two eyes than with one. It was also noticed, however, that with $90^{\circ}\text{W} + 270^{\circ}\text{BK.}$ the gain in the increase of the brightness seemed to be maximum while with higher white values in the standard the relative increase in the brightness with the opening of the left eye seemed to diminish.

It became evident, however, that the Indifference Point, *i.e.*, that shade of brightness which does not seem to change whether seen monocularly or binocularly lies somewhere between $30^{\circ}\text{W} + 330^{\circ}\text{BK.}$ and $60^{\circ}\text{W} + 300^{\circ}\text{BK.}$

Four new shades of gray were now introduced between the shades just mentioned, *viz.*, $40^{\circ}\text{W} + 320^{\circ}\text{BK.}$, $45^{\circ}\text{W} + 315^{\circ}\text{BK.}$, $50^{\circ}\text{W} + 310^{\circ}\text{BK.}$, and $55^{\circ}\text{W} + 305^{\circ}\text{BK.}$ Two other shades were also introduced in the two extremes, *viz.*, $20^{\circ}\text{W} + 340^{\circ}\text{BK.}$, and $270^{\circ}\text{W} + 90^{\circ}\text{BK.}$ While very good results were obtained with the 4 middle grays, and with the lower intensity, the results with 270°W had to be rejected for two reasons. First, everyone of the subjects (Prof. Kirschmann included) found this comparison extremely difficult and they were not sure of their judgments. Secondly, some of the observers demanded more than (360°) of White which, however, under the conditions of our experiment was a physical impossibility.

Some explanation is necessary so that the meaning of the figures given in the Tables X and Y may be understood. In Table X is given in the first column the amounts of White taken in the standard shades of gray on the colour-wheel (B).

TABLE X—(contd.)

Obs. F.		Obs. G.		Obs. H.		Obs. J.		Average.	
One.	Two.	One.	Two.	One.	Two.	One.	Two.	One.	Two.
								+	+
-5.5	+3.5	...	...	...	...	...	...	8.12	11.4
+20.5	+3.5	+27	+7.5	+107.25	+151.5	...	...	42.65	43.85
...
...	...	+105	+115.5	...	...	+23	+12	34.86	35.88
...
...	...	+166	+163.84	...	...	+5.5	+2.5	30.23	31.06
...
...	...	+48.80	+57.06	...	...	+24.5	+13.5	25.41	26.25
...
...
...	...	+61.25	+62.25	...	...	+5	+4.5	29.83	28.81
+8	-18.5	...	...	...	...	...	...	34.8	30.6
...
+57	+14	...	...	+76	+98	...	...	48.73	30.84
...
-26.5	-12	...	...	...	...	...	...	30.4	25.3
-9.5	-27.5	...	...	...	...	...	...	32.9	26.73
...
-26.3	-30	...	...	...	...	-36	-74.5	7.91	5.8
...

TABLE Y.

I	II	III	IV	V	VI	VII
Degrees of white.	Absolute Brightness Values.	Average degrees of white added in comparing with		Resulting values	Brightness of	Ratio between
		One eye.	Two eyes.	III	IV	V & VI.
20	3.16	8.12	11.4	4.06	4.43	0.91
30	4.25	42.65	43.85	8.87	8.99	0.98
40	5.32	34.86	35.88	9.11	9.22	0.99
45	5.87	30.23	31.06	9.15	9.24	0.99
50	6.41	25.41	26.25	9.17	9.26	0.99
55	6.95	29.83	28.81	10.19	10.08	1.01
60	7.5	34.8	30.6	11.23	10.81	1.03
90	10.75	48.73	30.84	16.03	14.08	1.13
120	14	30.4	25.3	17.28	16.74	1.03
150	17.3	32.9	26.73	20.81	20.14	1.03
180	20.5	7.91	5.8	21.35	21.12	1.01

In the columns marked "one" and "two" under each of the names of the observers are given the amounts of White in the discs on the wheel (A) that were in excess or defect of the amounts given in the standard when in the judgment of the observers the former shades of gray seen directly matched with those of the standard seen indirectly, first, with one eye and then with both eyes respectively. The last two columns under "Average" give the average of these values.

In Table Y we give in the first column the degree of White in the standard, in the second the absolute Brightness values of the standards chosen. They are easily calculated when we remember that the ratio of the brightness of the black and white papers used was found by polarisation

Photometer to be 1:40. The 3rd and the 4th columns give the averages again taken from the last two columns of the table X. The 5th and the 6th columns give the calculated brightness values of the variables when they have been judged to be equal by the subjects to the standards. The last column gives the ratio between the values in the columns 5 and 6.

Fechner from his experiments concluded that generally speaking the intensities of monocular and binocular vision are equal. With the closing of one eye a slight darkening of the visual field takes place but it immediately regains its former brightness. Aubert from similar experiments found that the binocular field was a little brighter than the monocular provided that the absolute brightness was not too great. Jurin was of opinion that the binocular field was $\frac{1}{3}$ times brighter than the monocular. According to Valerius the relation of intensities of the monocularly seen and binocularly seen visual field is independent of the absolute intensity and for weak stimulus the relation does not vary much from $\frac{1}{5}$. These experiments of Jurin and Valerius are open, however, to many objections, as has been pointed out by Robinson, most important of which is that "though the object observed was screened from one eye much light was still admitted to that eye a fact that would doubtless have an influence of the whole." Robinson's own results differed in two points considerably from those of former investigators. "First, the minimum points of effectiveness of the light applied to the second eye is found at higher intensities than by former authors on the subject. Second, the phenomenon is greatly dependent on the absolute intensity."

Now as to explanations. Fechner explains the phenomenon as a particular instance of the competition of the visual fields. When the difference between the quality and the intensity of the two visual impressions are not too great they are combined, but when that is not the case either one

suppresses the other entirely or there is a rivalry between them each replacing the other alternatively.

Hering also regards the phenomenon solely as instances of competition phenomenon.

Helmholtz explains that in these cases there is no change in the sensation of brightness but only in our judgment regarding them.

Aubert thinks that it is a matter of the distribution of attention. When the difference between the two impressions is not very great attention is equally distributed between them, while when the difference is greater the brighter one draws the attention exclusively to itself.

Sanford favours Aubert's view that the sensations of the two retinæ blend in a sort of average result when the difference is not too great, but one wholly suppresses the other when the difference is very great. McDougall suggests a physiological explanation based on his drainage theory. Myers seems to accept McDougall's physiological explanation. But the best explanation according to our opinion is given by Prof. Kirschmann. We reproduce below his explanation in his own words :—

“Let us call the physical intensity which arrives at the one retina I_1 , that arriving at the other I_2 , and that physical energy which is at least necessary in order to produce the binocular effect X . Now there are three cases possible. If I_1 and I_2 are both greater than X , in the case of binocular combination the subtraction of the energy X , which is needed for the effect, will cause a darkening of the binocular visual field but the brightness will still be greater than either I_1 or I_2 , singly. If X is just equal to one of the monocular intensities, the binocular intensity will be equal to the other monocular. The closing of the eye in which the image had an intensity equal to X , will then cause the vanishing of the binocular space effect but without any change in the intensity. This is the case where we have just reached the point of

inefficiency. Finally, if one of the monocular intensities, say I_2 , is smaller than the minimum value of X , the intensity of the binocular impression, when endowed with three-dimensional properties, will be smaller than I_1 , because a part of this physical intensity is needed in order to secure the stereoscopic effect and the exclusion of the second eye will by setting free again this part of the energy, be followed by an increase of the light intensity. This is the case in Fechner's Paradox."

Robinson also gives similar explanations and observes "The reason for the relatively slight effect of the light admitted to the second eye upon the brightness of the common visual field is of course that the purpose of the co-operation of the two eyes is not to increase the brightness, but to accomplish those parallaxic relations which are the principal means of binocular depth perceptions."

We suggest however that the phenomenon should be treated mainly as a psychical phenomenon. There is present in us always a tendency towards attaining a completeness, a striving towards harmony. This general tendency expresses itself in all our particular thoughts, feelings, and actions and so the phenomenon that we are here dealing with is also an expression of that tendency. When a monocular field is too dark, as soon as the other eye is open there is a feeling of disharmony which is replaced only when we have yielded ourselves to the dominating state of consciousness at the moment, *viz.*, the sensation of darkness together with all the feelings, etc., connected with that sensation with the result that we exaggerate the darkness and unconsciously add to its intensity. The whole field therefore takes a darker and more sombre appearance. That a marked emotional effect is produced in the observers whenever the discrepancy is too great has been amply testified to by the expressions used by them immediately on opening the other eye. Similarly in the case of very light fields we do not feel ourselves to be in harmony with ourselves unless we have yielded to the dominating

sensation and as before added to its real intensity. And there is a certain brightness where we feel quite at home whether we see with one eye or with both and that requires no mental readjustment to bring ourselves in harmony with them.

We give below a summary of the conclusions that may be deduced from our experiment.

(1) The experiment can be conducted in diffuse daylight from day to day without any material consequence to the results. Dark-adaptation, as has been suggested by some, is not an indispensable condition.

(2) Whether we see with two eyes brighter than with one eye depends to a great extent on the absolute brightness of what we see.

(3) When the absolute brightness is small, *i.e.*, when the field is rather dark (from 3.16 to 4.25 in our expt.) we see with both eyes darker than with one eye. Similarly when the brightness passes a certain limit (6.41 in our expt.) we see brighter with two eyes than with one.

(4) There is a certain range of brightness which retains the same intensity when seen binocularly as when seen monocularly (from 5.32 to 6.41 in our expts.). There is another such range near about the absolute brightness value 20.5.

(5) There is a particular range of brightness (near about 10.75 in our expts.) where the increase in the brightness of the field when seen with both eyes is greatest. Beyond that range the relative increase of brightness when seen with two eyes seems to diminish.

(6) Similarly there is a range of brightness where the greatest darkening occurs, when seen with eyes (about 3.16 in our expts.). There is another such range near the absolute brightness value 30.25.

"Natural" Reaction Time of a group of Bengali Boys.

M. L. GANGULI, M.Sc., AND M. N. SAMANTA, M.Sc.

This work is an effort to determine the norm of the 'natural' reaction-time. Considering the small number of experiments performed this norm may not coincide with the actual value that could be obtained with a large number of observations. This investigation is based upon 2,909 reaction-times given by 50 college students, besides the 'practice' experiments.

"There are many psychologists," says Wundt, "who regard the difference between sensorial and muscular reactions not as generally valid differences common to all persons and due to more or less complete modes of execution of the volitional process; they look upon sensorial and muscular reactions rather as individual differences, as so-called typical differences, in the rapidity of execution of reaction-movements." (Wundt, *Outlines*, p. 225.) There are others who think that the ultimate and the irreducible individual differences do not sufficiently account for the variation in the reaction-times. Each individual would give different reaction-times under similar objective conditions. The cause of variation, therefore, should be sought in the mental attitude immediately antecedent to reaction.

Both of these views may be reconciled. It is a fact that individuals differ in the values of their reaction-times under similar objective and subjective conditions. Some normally tend to give longer reaction-times and others shorter. In other words, when we analyse a large number of data, we discover that individuals usually group themselves under

two classes, *viz.*, those with larger reactions and those with small times. This must be due to individual peculiarities, or to use the old phrase, 'personal equation.' But at the same time we know that the same individual would yield different time-values for reactions under different sets of mental attitude. Experiments show that one and the same individual gives different reaction-times and even individuals with longer reaction-times revert to short reactions, specially when instructions tending to develop different mental attitudes are given. The two attitudes of quick and slow reactions can be developed to any degree of stability through a long course of training. When no particular effort is made to develop either quick or slow reactions, the time-values range between the two extremes and the attitude corresponding to the middle range of values is defined as the 'natural' reaction-attitude. In other words it is one in which there is neither a predominance of sensorial nor of the muscular tendency. It has been questioned, however, whether there is really a subjective 'natural' reaction-attitude, whether the time is not merely a mean or some other type of middle value which does not correspond to any specified and constant subjective condition. We do not desire to raise in this paper the theoretical issue of the reality of the subjective factor. From the turmoil of controversies, raised by the question of the central factor in intelligence and of the central factor in other higher mental processes that still lurks in the background, we cannot muster up sufficient courage to touch the issue. Our task merely consists in determining the middle range of values mentioned above from experiments upon a limited number of subjects.

The experiments reported here were conducted under the usual conditions of 'natural' reaction-time experiment. No specific directions were given to the subjects; they were left to 'face the situation in their own way.' Our subjects, though students of psychology, were not familiar with the

technique and theory of this particular experiment at the time when the investigation was undertaken. Their task with regard to the experiment was clearly explained and the usual time was given for developing a practised skill in handling the instrument.

The apparatus used was the Vernier Chronoscope of the Sanford-model. A flag signal was chosen as the (visual) stimulus.

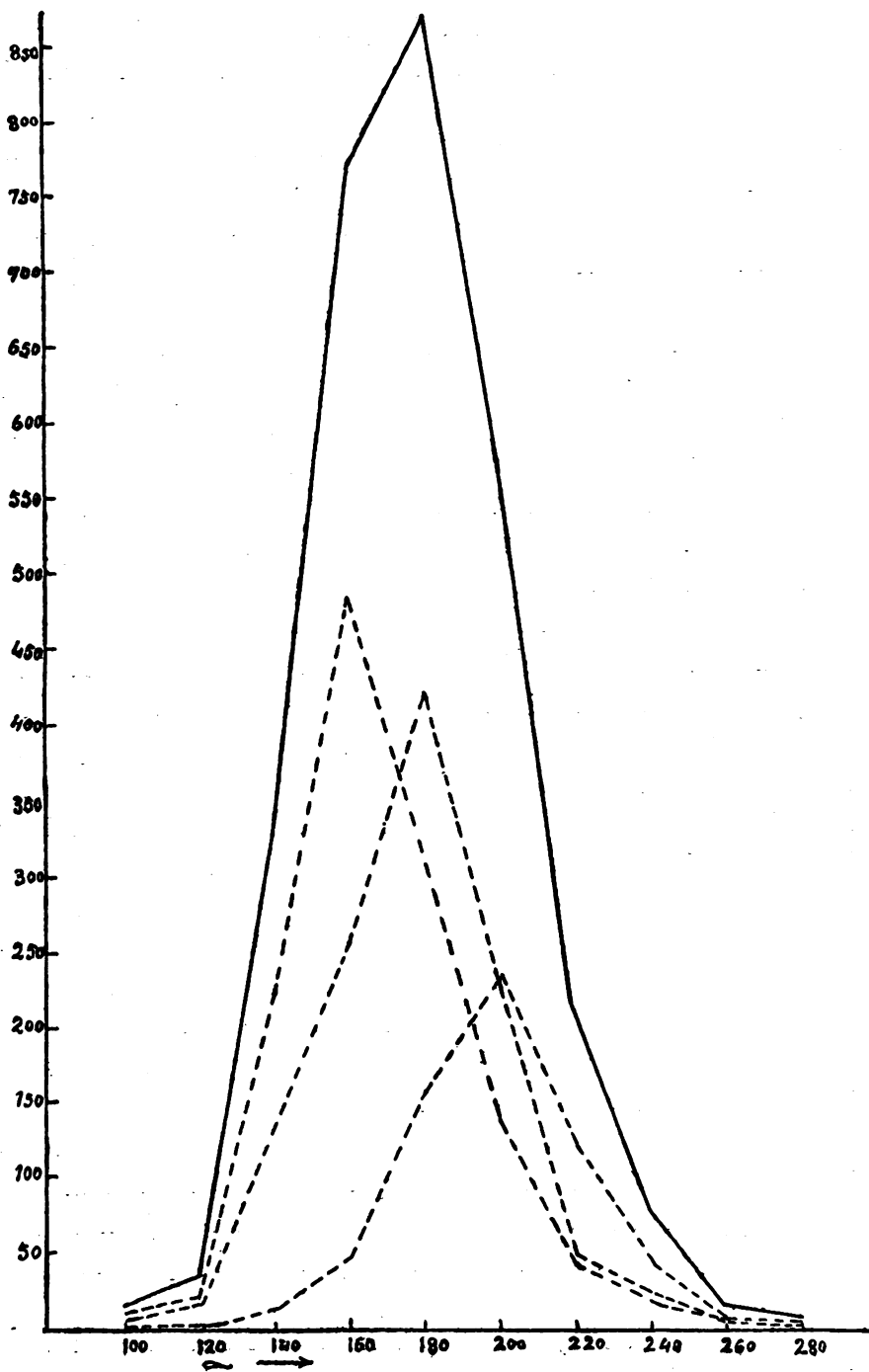
About 60 reaction-times were collected from each student excluding the 'practice' experiments as also the 'delayed' and 'premature' reactions. The reaction-times were recorded in five different series of about 12 readings in each. Rest was allowed between two series and 3 to 4 experiments were left out at the beginning of each series for the proper 'warming up' of the subject.

The mean reaction-time for each student has been determined. These reaction-times range from 155-209 σ . The subjects are divided into different classes according to the modal values of their reaction-times. The dotted frequency-curves indicate the modes for each class. The continuous line indicate the total frequency-curve for 2,909 readings, its mode being at 180 with an average deviation of 20.

The reaction-times of all the subjects have been grouped together in order of age. The college students being nearly of the same age the data collected are insufficient in number to warrant any definite conclusion as to the influence of age. It can generally be said that the reaction-time tends to increase from 20 years upwards.

During the progress of the experiment some peculiarities in the behaviour of the subjects have been noted. In about 6½% of readings the subject reacts with a jerk on the reacting key. In these cases the subject generally gives short reactions.

There are cases, about 4%, in which automatism sets in. The subject gives the same figure 3 to 5 times in



FREQUENCY CURVE

succession. It has also been noted that shorter reactions are followed by longer ones and *vice versâ*.

The mean, the mode, the median and the average deviations (A. D.) have been calculated and are given below.

The median is relied upon in those cases in which change of mental attitude is involved, specially if the investigation is based on a comparatively small number of readings. We have then three possible values for the norm: (1) the value obtained from the mean reaction-times (178), (2) the value obtained from the modes (180) and (3) the value obtained from the determination of the median (177). We shall accept the value of the norm (R.T.) as 177, this being the most reliable figure.

Table A.

							A.D.
1.	Norm	from	mean	R. T.	...	178 σ	20 σ
2.	"	"		mode	...	180 σ	20 σ
3.	"	"		median	...	177 σ	16 σ

The norm of 'natural' reaction-time, as found in E.B. Titchener, 'Instructor's Manual'—Qual., Vol. X, p. 216, is 190-220 σ . The norm for the Bengali students, therefore, is less than the value given by Titchener.

This is the first time, as far as we know, that any attempt has been made to determine a psychological norm of the reaction in Bengal. We are fully aware that the number of subjects studied by us is not large enough to warrant a reliable norm-value. And we also recognise that an attempt could have been made at a greater precision in the measurement of times. Improvements in these directions would naturally come if the importance of the problem be fully realised. Though the reaction-time experiment is not a new thing in the laboratories it can by no means be said that it has outlived its importance.

Its diagnostic value in the different types of mental tests and its significance as a measure of individual differences ensure its use for psychological purposes for a long time to come. And if any one is to develop the study either in the direction of mental tests or in differential psychology in Bengal or in any other part of the country the first step to be taken would be to determine norms, such as we have attempted here.

Notes and Abstracts

The Psychoanalytic Review.

VOL. XIII.

Parts I & II.

Erogenous Maturation by Henry Stack Sullivan.

There is a great deal that is very interesting in this contribution but like so much written by Americans, its style is sometimes so turgid as to render the author's meaning almost unintelligible. The author's basic contention appears to be that not sufficient attention has been paid hitherto to the functions of the palae-encephalon in summarising the psychological content of the personality. He formulates a hypothesis to the effect that situations in which the organism and the environment are both involved produce, by way of the end-organs, physico-chemical configurations in the central nervous system which constitute primitive biological symbols. The author points out that for some time after birth, the child devotes itself more and more to the gratification of sensory impulses, of which the oral are pre-eminent. There then follows what the author terms "maturation of the finger end-organs" with a development of pleasure in pulling or manipulating anything available. The genitals and the umbilicus now come in for attention. The author treats of the inculcation of an irrational fear of the penis as an object to be looked at, and on this topic he has a good deal to say of serious import. He wittily refers to "sexual sin" as "the mother of psychiatry." Further he deprecates, probably quite rightly, the tendency of psycho-analysts, to thrust upon the female conclusions derived for the most part from a genetic study of the male, and invites investigation of the erogenous maturation of the female along the lines adopted by him for the solution of the problem in the male.

The Synthesis of Dreams, by Havelock Ellis.

Dr. Havelock Ellis contributes another instalment of his remarkable papers on dream synthesis. Besides the scientific value of the paper by

this distinguished author, the extraordinary charm of his style lends additional interest to the study of his theory and conclusions.

The Psychopathology of exhibitionism by Ben Karpman.

The author makes a very important addition to medico-legal psychology. Dr. Karpman considers the exhibitionist to be the victim of a neurosis with the usual concomitants of the condition. While the outset of the disease is ordinarily attributed to a variety of factors, a more careful study reveals that these are only superficial and that the true causes lie buried in the early life of the individual. The exhibitionistic act appears as an impulsive and unconquerable reaction with prodromal symptoms not unlike those observed in severe anxiety states. The act is a substitute for forbidden incestuous cravings, and because it is a substitute it cannot fully effect complete release or gratification, so that the urge is never stilled, and finally assumes the character of a compulsion neurosis. Legal punishment is useless. The only cure lies in psychotherapy.

The Genesis of Genitality by Otto Rank.

This paper should be read in conjunction with that by Dr. H. S. Sullivan, Erogenous Maturation. The author shows how the Super-Ego in the woman differentiates itself entirely from that in the man. While the man can work out on a genital level, in his father's identification, the original oral sadism, instead of having to dispose of it socially, the woman's mother identification grows up as a direct continuation of the primitive sphincter-ego and so, contrary to the man, inhibits her sexual aggression and makes her in this way socially adjusted. With the man on the other hand, the socially necessary inhibition of his sexual aggression is accomplished by the fear of castration from the father, characteristic for the man only, whereas the woman knows only of the biologic castration at the oral stage. These differences explain some of the specific characteristics in man and woman and as such should be taken into consideration in further characterology and sex ethics. In general the mother identification of the woman will always compel her to maintain rather the ethics of the first maternal command, "You mustn't" (that's not nice for a girl) with regard to her social and sexual behaviour, whereas the man will follow the aggressive paternal imperative, "You must."

Psycho-analytic Study of a Case of Organic Epilepsy
by *Karl Menninger*.

The case presented is one of a typical epileptic syndrome arising upon a basis of definite structural cereopathy, presumably syphilitic. Although throughout systematic psycho-analytic investigation was impracticable, the dreams, free associations, and clinical developments made it seem clear that the occurrence of convulsions was in part determined psychogenetically. The intolerable pressure due to unconscious conflicts which arose through the patient's attempts to fit her infantile psyche into an adult heterosexual relationship, led to a search for relief into an epileptic flight. The convulsions began with her engagement; they became aggravated by her marriage and got most severe during her pregnancy. They decreased rapidly when she lived apart from her husband, were intensified by his visits, and decreased markedly after her separation and divorce. The author believes that this study adds confirmatory evidence to the theory that the manifestations of structural (organic) pathology are associated with, if not determined by, psychic mechanisms which are accessible to study by the psycho-analytic method with, in some cases, objective clinical improvement.

Paranoia from the Subjective Point of View
by *A "Paranoiac."*

The author expresses a belief that until physicians discard their present theories as to the nature of paranoia, they will not be able to make possible the direct dissolution of the delusions of their patients. At present their therapy depends upon the pressure of disapproval, expressed in one way or another. Such therapy succeeds only by chance and with great waste of energy and in a way quite unrecognised. The author holds that there is nothing abnormal in a delusional system. It is only when the delusion or delusional system leads to conduct that calls forth disapproval strong enough to place the individual under restraint, that paranoia is fully developed. If the delusion or delusional system can be countered by a friendly searching out of the fundamental misinterpretation upon which either is based, the delusion or delusional system may be dissolved and the patient returned to normal life. Such a searching out and presentation are spontaneous with sympathetic parents who deal successfully with misbehaving children. The author hopes that

the same treatment will be accorded to the paranoiac, whether in a mental hospital or in a prison, as a result of further recognition of its efficacy as well as of the fact that neither the individual nor heredity can any longer be blamed.

"Form Psychology and Psycho-analysis"
by Isador Coriat, M.D.

This article deals for the most part with a recent remarkable book entitled "The Mentality of Apes" by Wolfgang Koehler. Koehler's observations on anthropoid apes verify and illuminate certain psycho-analytic theories from standpoint of group psychology and of libido and ego development.

OWEN BERKELEY-HILL

American Journal of Psychiatry, January, 1926,
Vol. V, Part 3.

The Newer Psychiatry by William Healy, M. D.

As might be duly anticipated from so distinguished an authority this contribution is full of interest. Dr. Healy begins by stating that the modern practising psychiatrist is called on to be one of the most highly educated and broadly cultivated of all professional people. He quotes Dr. Alexis Carrel to the effect that the development of the Science of psychology is our only hope of improving the quality of the human being. Dr. Healy thinks a time must come when the psychiatrist's training will have to be greatly modified. He asks whether the psychiatrist need be a qualified general medical practitioner. He makes no plea for a less severe discipline, rather for a more severe training.

Psychotic Children: Treatment and Prophylaxis
by A. A. Brill, M.D.

Dr. Brill illustrates from his own case records how a neurosis or psychosis may follow in certain constitution solely from environment. He thinks the time has come when one may speak of mental and emotional

tendencies for psychoses and neuroses and have in mind children who unless properly adjusted, will in all probability develop psychoses and neuroses and that such tendencies manifest themselves in preponderating schizoid or syntonie reactions in the sense of Kretschmer and Bleuler.

The Laboratory Method in Psycho-analysis
by Trigan Burrow.

The author deals with the question, as he understands it, of getting the psycho-analytical technique more into line with laboratory technique and correspondingly away from its tendency to become a purely therapeutic method of the clinic. Aided by his own students, Dr. Burrow has devised a social or consensual technique that he regards as definite as that of the laboratories of objective biology. Under this laboratory discipline, reactions which in accordance with the personal technique of psycho-analysis, are studied in private confidence from a necessarily private basis of observation, have come to be observed commonly among a consensus of individuals recognising and sharing among themselves a common basis of comparison.

OWEN BERKELEY-HILL

The British Journal of Medical Psychology

VOL. VI.

Part I, 1926.

This first part of Vol. VI of the British Journal of Medical Psychology is devoted entirely to a symposium on the Definition and Diagnosis of Moral Imbecility. The contributors comprise some of the greatest authorities on this topic in Great Britain, namely, Drs. A. T. Tredgold, M. Hamblin Smith, W. Rees Thomas, F. C. Shrubbsall and Professor Cyril Burt. The contribution made by Professor Burt is, as might be expected from so eminent a psychologist, of the highest importance. Nobody interested in mental deficiency, especially in its relation to delinquency, should omit to study carefully the whole of this number of the British Journal of Medical Psychology.

The Journal of Mental Science

VOL. LXXII.

No. 296-January, 1926.

On Endogenous and Exogenous Factors and Character Formation by George A. Aden, School Medical Officer, City of Birmingham.

Dr. Auden's very stimulating paper will be read with great interest by all psychiatrists. Although he does not go so far as some and try to classify the whole community in terms of the activity of the different members of the endocrine hierarchy, he agrees with Kretschmer in his assumption that there exists a correlation between somatic nonfiguration and psychic type which determines to a large extent the form of psychoses exhibited by each. Besides such purely biological factors, Dr. Auden calls attention to other factors that play a part in character formation. The principal of these is the degree of general intellectual capacity possessed by the individual whereby the power of reasoning and forming judgments is compassed. He considers character to have a fourfold basis which he represents schematically by the four quadrants of a doubly bisected circle. The endogenous factors which comprise the influences which arise from the somatic constitution and the innate quality of the brain, upon the adequate working of which depends the general intellectual capacity, form the upper two segments. Both of these qualities may be described as biological in that they may be transmitted from parent to offspring. On the other hand the exogenous or social, *i.e.*, the dis-social (or individualistic) trends, are represented by the lower segments. these trends are essentially antagonistic and the state of conflict which results between them will be heightened by the degree of suggestibility inherited in the individual.

*The Myth of the Unconscious Mind by
Dr. Joseph Shaw Bolton.*

Without in the least realising what he was doing Dr. Shaw Bolton has made a valuable contribution to the evidence for the existence of the Unconscious. No one could possibly read this extraordinary paper without recognising that from start to finish it is nothing but an exposition of Dr. Shaw Bolton's own personal complexes.

OWEN BERKELEY-HILL

The International Journal of Psychoanalysis.

VOL. VII.

Part I. January, 1926.

The Psychological Relations between Sexuality and Alcoholism by Karl Abraham.

This very interesting contribution follows immediately upon the obituary notice of its distinguished author by whose death the psycho-analytical school has suffered an irreparable loss. Abraham begins by pointing out how in myths the procreative power in man is treated as identical and interchangeable with the creative power of God and further, how the naive imagination of mankind identifies intoxicating drink, on account of its property of producing sexual excitation, with semen. Tales of the drink of the Gods run all through Indo-Germanic mythology. For instance the "soma" of the Hindu mythology is conceived as a source of life and inspiration and is identified with the intoxicating drinks of mankind. The identification does not however stop here but is equated with human semen. Men rely on alcohol because it increases their sense of manhood and flatters their masculinity-complex. The psycho-sexual constitution of women incites them far less to alcohol. Women who have a strong inclination for alcohol will invariably turn out to have a powerful homosexual tendency.

The Neurotic Character by Edward Glover.

Dr. Glover's paper deals with the fairly common type of patient who comes for psycho-analytical treatment, namely, those with symptomatic constructions having rather a larval character. Dr. Glover explains his view of the neurotic character by contrasting the neurotic symptom with the psychotic symptom. He shews how the rise of psychic tension in any individual demands some modification to bring about relief. Instinct tension being a tension from within, the requisite modification can take place within the individual. This is the auto-plastic method, to use the phrase coined and adopted by Freud and Ferenczi. As the Ego develops and instinct tension becomes bound up with outer objects, effective discharge involves modification of the environment. This is the alloplastic

method as opposed to the autoplasmic. The former is chosen by the psychotic, the latter by the neurotic. This can be seen by contrasting the subjective attitude of patients to a phobia and to a delusion respectively. Dr. Glover while correlating the neurotic character with neurosis and perversion distinguishes it from both.

Infant Analysis by Melanie Klein.

This paper was first published in 1923. Dr. Frau Klein is probably the greatest living student of child-analysis and her paper bears careful study. The paper is illustrated with actual case histories. Frau Klein makes out a strong case for analysis in early childhood as a help to all education. She shows how libidinal fixations determine both the genesis of neurosis as well as the direction of sublimation. It is the force of repression which determines whether this path will lead to sublimation or turn aside to neurosis.

OWEN BERKELEY-HILL

**Internationale Zeitschrift fur Psychoanalyse,
XII Band, 6 Mai 1926, Heft 3.**

The present volume of the Journal is really a valuable addition to the literature of the science of Psycho-analysis. It celebrates the 70th birthday of the great founder of the science, Prof. Sigmund Freud of Vienna and it can be said without hesitation that the offerings which his devoted followers have brought to him on this happy occasion are well worthy of being placed at his hands.

In the very choice language in which Ferenczi offers his congratulations to the master he very well expresses the feelings aroused in the hearts of those who have come into contact with the science of Psycho-analysis either from the theoretical side or from the practical side as well. The large circle of suffering patients as also the still larger circle of "healthy sufferers," whom Psycho-analysis has helped and rescued from untold miseries will ever remain grateful, directly or indirectly, to that wonderful personality, Sigmund Freud.

In his article "Das Problem der Unlustbejahung," Ferenczi takes a further step towards the solution of the problem of the development of the Reality-sense—a problem which he has already discussed in another

volume of this Journal. In the meantime Freud's work "Die Verneinung" has appeared and in light of the principles therein contained Ferenczi takes up the problem anew and determines the steps in the development to be somewhat as follows :—

First of all there is a check in the unlimited enjoyment of pleasure (as *e.g.* when the mother's breast is not immediately forthcoming). The feeling that it is not absolutely free is forced upon the child's mind ; this produces "Unlust." Its first tendency is to ignore that which obstructs it, which is only a doubtful effort of the Pleasure-principle to assert itself against the onset of the Reality-principle. It is then found that though the recognition of an inimical Reality is an Unlust, the non-recognition of it is still more painful, and hence this quantitative consideration becomes a decisive factor in the acceptance of Reality.

The development in the conception of "Ego" has received a good deal of attention, not less than five articles being devoted to the theme by Jones (Origin of the Super-Ego), Federn (Variations of the Ego-feeling), Odier (About Super-Ego), Glover (Concept of Ego) and Müller-Braunschweig (Origin of the Feminine Super-Ego). The Super-Ego, according to Jones, is the continuation of the Oedipus-complex and is brought about by the Ego-impulses, which are aroused by the unfriendly situations in the outer world (*e.g.* parents) and the Sexual impulse. Glover distinguishes between "Impulsive Urge" and "Impulsive Reaction." By the former he means those impulses which compel the organism to take the needed steps to relieve internal tensions (*e.g.* Hunger, etc.), while Reactions always refer to external situations. Admitting, however, that this distinction cannot be pressed too far he is of opinion that what we call "Ego" corresponds not to the driving side of the Impulse but to the reacting side.

The "Doctor-play" of the children, says Simmel, offers an outlet to all the excitations originating from the Oedipus-complex. It sometimes happens that the profession followed by some doctors is not their true vocation but is only a continuation of the "Doctor-play" of their childhood and it is not seldom that in such cases the 'Specialist' falls a victim to the disease in the treatment of which he himself has specialised. Another article of great general interest is about the psychological effects of intoxicating poisons. S. Pado shows that the effect of narcotics, sedatives, etc., is to remove unpleasant tensions and at the same time to call forth pleasant ones. But when carried to excess these and other intoxicants

disturb the normal relations of the Ego with Reality and the Ego becomes subjected to Reality.

Besides many other articles of general interest all of which it is not possible to take notice of in this short review some articles of rather special interest are also included in the volume, *e.g.*, Skotomisation in der Schizophrenie by Laforgue, Delirium Tremens by Kielholz, etc. The volume carries as Frontispiece an excellent photograph of Freud.

S. C. MITRA

Internationale Zeitschrift fur Psychoanalyse, XII. Band, 1926, Heft 2.

The close of the last year marked also the close of a great career in the field of Psycho-analysis. By the death of Dr. Karl Abraham of Berlin the science of Psycho-analysis has lost one of its most devoted followers, a sincere worker and a keen investigator. Not only that, society also has been robbed of a very charming personality. We had an opportunity of making personal acquaintance with the deceased during the last International Congress in Bad Homburg. We were at that time struck by the extreme politeness of his manners, the geniality of his temper and the unfailing courtesy which he extended to one and all even at times when his energies and his patience were being taxed to the utmost.

The volume under review is issued in memory of the deceased and contains references to his life and works. There is an article written by Abraham himself, perhaps the last written by him, about Coué's method of curing diseases by Auto-suggestion. While on the one hand, there is a large number of enthusiastic champions of Couéism, there is, on the other hand, a whole host of opponents specially among medical men. Abraham considers the three objections to Couéism raised from the side of Medicine, *viz.*, (1) That it is impossible to cure an organic disease by suggestion, (2) That it is absolutely useless to treat patients suffering from all possible kinds of different diseases, simultaneously and *en masse*, (3) That it is perfectly ridiculous to think that diseases can be cured by the mere repetition of a formula. As the Psycho-analyst has convinced himself about the tremendous influence of the Unconscious in the causation, continuation and curing of organic diseases it treats the first objection of the medical men rather sceptically. It is possible, under certain circumstances, to cure organic

disease indirectly by suggestion. With regard to the second objection Abraham thinks that the success of the method, or rather the fascinating effect produced by the method, is only a matter of Crowd Psychology. Coué is the leader whom the crowd follows. In order to influence a crowd one need not give logical arguments; one has only to draw vivid pictures, to exaggerate and *to repeat constantly the same thing*. In this last mentioned fact lies also the reason for the efficacy of Coué's formula or, for the matter of that, of any formula at all. On the whole, however, the successes achieved by Coué's method are only temporary ones. The diseases have been repressed but not cured. Therein lies one great distinction between Couéism and Psycho-analysis.

Jones gives detailed information about the various activities of the deceased and classifies his published works under the headings of Psychology of Childhood, Sexual subjects, Clinical essays, General essays, and Applied psycho-analysis. The article ends with an attempt at a psychological analysis of his character. A freshness of youth and an invincible optimism were two very remarkable traits of his personality. Witty when occasion demanded, he always made an impression of freshness and strength. In his manners he was always polite, cheerful and kind. He succeeded in mastering himself completely.

The volume contains also a complete chronological list of all the published scientific works of Abraham. Eitingon, Sachs, Radó, Reik and Wulff have given expressions to their feelings in their respective Psycho-analytical societies. Reports of the different branch societies all over the world are also published in the issue.

A photograph of Abraham is given as the frontispiece.

S. C. MITRA

Journal of Experimental Psychology.

VOL. VIII. No. 1.

The Relation of Tongue-movement to Internal Speech by Agnes M. Thorson.

The writer starts with a survey of the studies on the problem by previous workers, and noting the defects of the experimental procedures hitherto adopted suggests some improvements in that direction. The

apparatus used in the present study is a device of Dr. Lashley, based on Sommer's 'Movement Analyser.' The special merit of the apparatus, as claimed by the writer, is that while it is sensitive to tongue movements of one-fifth of a millimeter, it precludes the chance of respiratory or swallowing movements being recorded. To cover different aspects of the problem 18 subjects, mostly graduates, were treated to five different groups of task. The result of this experiment shows that the movements of the tongue do not occur universally in internal speech or verbal thought, and in the cases where they occur the percentage of correspondence between them and the movements in overt speech of the same words is very low. In other words, there is no evidence to establish a correspondence between movements of the tongue and internal speech.

The present study though throwing light on some interesting features of tongue movements, furnishes no clue to an understanding of the actual mechanism of internal speech.

Fatigue Tests and Incentives by Helen F. Whiting and Horace B. English.

With the co-operation of 16 undergraduates a series of tests designed to study the effect of fatigue upon the accuracy, speed, and difficulty of both physical and mental work have been performed before and after college hours. The results show no indication of the efficiency being affected by the normal daily fatigue. Continuous work for ninety minutes in performing a series of tests twice over—once in a given order and the again in the reversed way—shows no difference of efficiency score in the two cases. Yet a feeling of fatigue is induced in the subjects. Since there is no loss of efficiency in these tests nothing can be said about the effect of incentives in overcoming any work-decrement. On the strength of these experiments the writers differentiate fatigue from physiological exhaustion, and put forward the hypothesis that fatigue is a "negative conscious motive to action."

Relative Performance of College Students as conditioned by Time of Day and Day of Week by Donald A. Laird.

112 college students have participated in a series of mental tests extending over six weeks. The individual curves of rise and fall have this interesting uniformity that the efficiency of performance reaches the climax

on Wednesday, the rise being gradual on that day but the fall very abrupt. From 8 A.M. to 5 P.M. the curve shows a steady decline. From 8 P.M. to 10 P.M. there is a rise to be followed by a loss in the next one hour.

Reaction to Visual Stimuli in Affective Settings

by F. L. Wells.

In this study an attempt is made to measure the latent periods of affective reactions in the case of visual stimuli. The subjects are selected from amongst graduates in Expt. Psychology, and picture cards depicting faces of women and landscapes are exposed by means of Dodge's tachistoscope. Of a particular set of picture cards the one that seems about midway in order of prettiness is used as the standard, and the rest as variables. The subject is required to raise the right hand if the variable is more agreeable than the standard, the other hand if not. Introspective account is here of great value in as much as it is the ultimate criterion of whether the affective process has governed the reaction time. Out of the total number of 277 affective settings about two-thirds are, as revealed by introspection, predominantly affective, while the rest are either cognitive in their character or of doubtful significance. The findings of this experiment put the general value of affective reaction time to about 800σ .

S. K. BOSE

The Journal of Applied Psychology,

VOL. X, No. 1.

Learning and Stability by George S. Snoddy.

This is a psycho-physiological analysis of a case of motor learning with clinical applications. For this experiment a suitable instrument called "Stabilimeter" was devised, on the basis of mirror-tracing instrument, but with some more suitable appliances for the recent study. Rapidity in response was counted as error. Each second (t) was counted as one (e) error at a certain speed while in slower movement the error was counted as one-half the time score. In this way the capacity of a sensory-motor pattern to endure stimulation was measured. There is study of individuals as also a brief clinical study of particular types of subjects. There are possibilities of utilising this device for clinical purposes.

On the Identification of Certain Spoken Words by their Tactual Qualities by Robert H. Gault.

It is an account of a very interesting experiment of tactual interpretation of speech by totally deaf subjects in terms of vibrations at the tips of the fingers. After some amount of practice, new words (of known elements) were put to the subjects for identification. At first the names of the days of the week were given in a particular order. The test consisted in correctly identifying the days when the order of presentation was altered. The result was that when the possible number was 280, the actual number was 161 and the chance was 40 to 42 for the whole group of experiments. Similar experiment was also made with the names of the months, the result of which was that when the total of possible identification was 300, the actual number was 165 and the correct guess was 25 to 27 for the whole group of experiments. The liability to misinterpretation was also considered in both the cases. In this second experiment a new subject was introduced. He could identify only 3 out of 20 possible cases, this score being less than that of all other trained subjects.

Moral Judgment in Female Delinquents by Weber.

The writer tested a group of female members of the University as well as of the Reformatory. A list of 16 'bad practices' was presented to them and they were asked to arrange them in their order of badness. It was found that their delinquency was not due to the absence of normal moral insight, its cause lay in their emotional volitional or intellectual life. The sex offence was regarded as the most offensive of all.

A Demonstration of the Language Difficulty involved in comparing Racial Group by means of Verbal Intelligence Test by S. L. Wang.

This paper discusses the important subject of racial differences in intelligence. It is generally maintained on the basis of the finding by verbal intelligence test, that the native white Americans are superior to other races. The writer holds that the accident of language has played an important part in these tests. After a long course of experiment he found that the difficulty of language is one of the main disturbing factors in the present form of intelligence tests.

A Study of Certain Aspects of Advertising in the "Saturday Evening Post" by Warden, Yahn, Lewis and Figenmann.

A series of experiments was performed in order to determine the effect of the increase in the size of advertisements, the increase in the ratio of advertisement to reading space, the development in the use of art-forms, and the use of coupons of full page advertisements. It was found that the Automobile and its accessories attract most attention, toilet articles come second, while office fixtures and supplies stand last. The results show that the free-coupon is one of the most successful devices employed in advertising.

Value of White Space in Advertising by Edward K. Strong.

An experiment was performed to determine the value of white space used now-a-days in advertisements for the purpose of a greater degree of attention. The result shows that nearly 20 % of additional area used as white space about the advertisement produces the greatest increase in effectiveness, when the cost is also taken into consideration. The attention value can be profitably increased by additional space of not more than 60% of the proper advertisement area. Several studies show that attention value increases nearly as the square root of the increase in area.

Other important subjects are—Tests for Transportation Pilots—by A. J. Snow, Intelligence and Height-weight Ratio—by Edna Heidbreder, the Suitability of the Downey Group Will Temperament-test as a test for Children—by Elizabeth B. Hurlock, the Return from Follow-up Letters to the Questionnaires—by Herbert H. Roops, and Correctness of Judgment based on Sensation, Intensities and Time allowed for making Judgment—by Walter Scott McNutt.

S. SINHA

Industrial Psychology in the Academic Curriculum.

"The growing recognition of the importance of Industrial Psychology is reflected in the recent establishment of a Diploma in the subject by the University of London. Industrial Psychology is also an optional subject of examination for the degree of Bachelor of Commerce in the same University. Courses of instruction for the Diploma are divided in London throughout the year at University, King's and Bedford Colleges, and (in Industrial Psychology) at the London School of Economics and at the National Institute

of Industrial Psychology, the teachers at the two last-named institutions being mainly members of the staffs of the Institute, and of the Industrial Fatigue Research Board. At Cambridge a paper and a practical examination in Industrial Psychology form one of the optional subjects for the ordinary B.A. degree. The Cambridge course of lectures on Industrial Psychology, extending over two terms, is recognised by the Special Board of Economics and is attended by students who are reading for the Economics Tripos, as well as by those who are reading for Part II (Psychology) of the Moral Sciences Tripos. In the Universities of Aberdeen and Manchester, Industrial Psychology is one of the optional subjects for the degree of Commerce. In Manchester, as in London, the course is attended by persons employed in industry as well as by University students. At Aberdeen the examination and the course of instruction include practical work, *e.g.*, on the work curve, economy of effort, time and motion study, vocational tests, etc. In the University of Edinburgh a course of lectures is given on Applied Psychology, a considerable portion of which is devoted to problems of Industrial Psychology; this course is compulsory for the Diploma in Education. At the same University, Psychology and the Organization of Industry are optional subjects for the degree of Bachelor of Commerce, and a special course of lectures is given in relation thereto. An Honours B. Sc. course in Psychology has just been instituted at Edinburgh, of which the last year may be devoted to Industrial Psychology." *Myers—Industrial Psychology in Great Britain* (pp. 24-25).
